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ABSTRACT

A study was undertaken at the West Virginia School for the Deaf to test the assumption that the modes of thought of deaf children could be improved, and that improvement in concept formation would result in improvement in testable areas. Sixteen primary school children of approximately equal ability were selected and paired to form the control and experimental groups and attend one-half hour daily labs. The control lab provided intensive language training in an informal situation, and attempted to motivate children through experience. The experimental or thinking lab, which was non-verbal, worked in the preoperational and concrete operational stages of development. The child's experiences were used as foundations of all logical thought and concept building with various thought games being employed (e.g. Concentration). Children in both groups were tested in September and May of the school year and will be retested. A careful comparison of test results should provide much information about deaf thinking, and hopefully, a new method of teaching. (GD)

A PROGRESS REPORT ON A THINKING LABORATORY FOR DEAF CHILDREN

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Piaget says that the child himself is the architect of his intellectual growth. Deaf children are poor architects. Lacking language, and lacking free social interchange, and lacking experiences understood or shared, the young deaf child cannot be a good architect. He has no building blocks.

Essentially the thinking lab at the West Virginia School for the Deaf was conceived to provide some of the building materials which the deaf child so badly needs.

Piaget maintains that all normal people go through four stages of intellectual development. In a baby, knowledge is the actions which are responses to objects encountered. As a child begins to reflect on his actions, he enters the second stage "preoperational representation", intuitive thought, largely based on perception. Here the action of the child is all important to him, but his knowledge is not systematized. He cannot order and relate his own actions. At the age of about seven he enters a third stage, that of "concrete operations". Here he begins to order his own actions, and to order and manipulate objects, and to understand relationships. His understanding is limited by the direct experience he has had. Truly abstract thinking, the ability to deal with the possible without reference to the actual, comes with the beginning of adolescence. The child enters the stage of "formal operations", and only then can he construct theories, and make logical deductions from them, without needing empirical evidence.

Piaget maintains that language does not structure logical operations, but it can direct attention to pertinent factors of a problem, and can control perceptual activities. Moreover, among hearing children, performance on Piaget type tasks has a high correlation with verbal ability. Very little testing in this area has been done among the deaf population, but it is questionable that average deaf high school graduates frequently exercise activities proper to the stage of formal operations, or theory construction.

The Department of Health, Education and Welfare gave a grant to Dr. Hans Furth in September of 1968, so that we could test the assumption that the modes of thought of deaf children could be improved, and that improvement in concept formation would result in improvement in testable areas, i.e., school achievement, including language.

In the summer of 1968, we paired each student in the primary school with a peer of approximately equal ability and age, labeling each pair 1 and 2. Students numbered 1 go to the control lab. The control lab provides intensive language training in an informal situation, attempting to motivate children through experience. The second group of children go to the experimental thinking lab. Both groups are divided into classes of eight children each, and each class has one half hour of work in the lab every day. Each lab has approximately forty six students from the primary level.

The thinking lab is working only in the preoperational, and concrete operational, stages of development. In these areas the child's experiences are the raw materials which he will transform into concepts that are the foundation of all logical thought. In the lab, experiences can be arranged which should, first, make the deaf child aware that he is thinking; second, help the deaf child have a series of <u>successful</u> experiences, that stimulate his natural pleasure in thought; third, help him to form concepts, to organize his thought.

Because throughout the learning experience we want the deaf child to find the greatest pleasure possible in thought, we have made the thinking lab non-verbal. This insures that even those children with a poor aptitude for language, can be completely successful.

All the materials in the lab are presented as games, and when it is possible the children work in teams. It is necessary to encourage what Piaget calls "social transmission", encounters with other people, particularly where those people may work toward the same end, but view the means of achieving it differently. Deafness promotes solitary action, and the lab tries to foster group action.

I will first describe an attitude of thought, and then describe a few of the games which we are using to promote that type of thinking.

Children have great difficulty grasping more attributes in the relationships of objects than they can see. They cannot draw a triangle upside down, if they are shown that triangle right side up. When children draw a chimney on a house, the chimney is often at right angles to the slope of the roof, gaily defying gravity. If what you see of an object differs from the child's viewpoint of the same object, the child cannot predict what you see, and usually is not aware that it is different.

Accordingly, we have worked out a group of perspective games, to give the children practice in changing viewpoints. This is practice in mental, rather than physical, manipulation.

The teacher draws an equilateral triangle, base down, on a sheet of acetate film. Using an overhead projector, she projects the triangle onto a white, washable chalk board. The children are given water color markers, and asked to draw the triangle upside down on the board. Then the children reverse the image on the projector, and check themselves. When they have successfully upended many images, we return to the triangle, adding eyes and a smile. The children invariably invert the triangle, but not the face inside it. In the same way, the group works on left to right reversal, the teacher being careful always to mix images so that some change when they face another direction, as an E, and some do not, as an O. The older classes (ages nine to eleven) have become quite adroit at this, and with few exceptions can now mirror write easily.

The younger classes also enjoy playing "Do as I Do", in which the teacher stands in front of, but with her back to, the class, and raises her right arm, stands on her left leg, and so on. The class faithfully repeats her movements exactly. Then the teacher turns and faces the class, and raises her right arm. Instantly all the left arms go up. The teacher turns away again and the children compare their left arm to her right one. They change their minds and raise arms. The teacher turns once more, and now some children have right arms raised, and some have left ones up, and one child, way in the back, has them both up. He won't be caught again.

Another game; a toy car is placed in the middle of one of our big tables. We have previously taken polaroid photographs of it from four or five different angles around the table. The class stays on one side of the table, except for one child, who moves from viewpoint to viewpoint around the table. At each viewpoint, the class chooses a photograph which fits, not what they see, but what they believe the other child should see. A variation of this is to show the group viewpoint-pictures of a small assortment of blocks or objects, and ask the class to build the grouping shown in the pictures.

Another area of concept building in which deaf children need practice is classifying and ordering. We use large hoops and pieces of card board in three colors, three shapes (triangle, square, and circle), and three sizes. Beginning with one hoop the children place all the round pieces inside, and all the others outside. After they can sort for color, size, or shape, we add another hoop, overlapping the first. Then we sort for red objects in one hoop, and squares in the second. The children learn to put red squares into the circle made by the overlapping hoops. When this is simple, we add a third hoop, and sort for size, shape, and color all at the same time. Since the overlapping of three hoops produces seven areas to sort into, this is a complex problem for even the most sophisticated children.

We have also made a special deck of cards, which enables us to sort in the same way, but which adds a fourth attribute, number. Some of the cards have only one square, some have two, etc.

Regular playing cards can be used for sorting, and all our children enjoy Solitaire, Fan-Tan, and War, three simple card games in which sorting for one or more attribute is important.

Using the overhead projector, we play a game in which the teacher flashes a picture of four objects onto the screen, for a very brief time. The screen is divided into quadrants, and one object appears in each quadrant, for example, three circles and one square. The children have to name the quadrant in which the wrong object, the object that is not part of the set, appears. Here, speed, and close attention, are combined with sorting skills.

Thinking requires the coordination of senses and brain, and we play a game called Feel and Find that gives the children practice in coordination. The teacher prepares identical pairs of objects, as, two wrapped sugar cubes, two pearl buttons, two silver spoons, and two stainless steel spoons in a slightly different pattern, two marbles, two small plastic blocks, two safety pins, two paper clips. The list of things to be easily found is endless. Then one of each pair is put into a box and it's mate is placed on the table in the classroom. Without looking, the child reaches into the box and finds an object whose mate has been shown to him on the table. He is not allowed to touch the item on the table; he cannot look into the box. This is great fun, and can be made quite difficult if objects of similar size and shape are previously chose. We frequently play this as a team game, where one team chooses objects for the other team to find. Here, strategy plays a role in the outcome. Many children don't understand that some objects are more difficult to find than others, and will persistently choose a large plastic block, or a popsicle stick for the other team to find.

Memory plays an important role in thought, and we have used a commercially prepared game, "Recal", to help train memory. In this game an arrangement of cards is shown to the children for fifteen seconds, and then the children have fifteen seconds in which to duplicate that arrangement, from a similar set of cards.

We also play Concentration, using a regular deck of cards, and playing it as it is seen on television, although we have omitted the rewards for success that television offers.

And, using the overhead projector, we sometimes flash very quickly, a three or four digit number on the screen, and ask the children to reproduce it on paper.

We have done some work in probability, where children are asked to predict an outcome. The children are shown two groups of marbles, ten red, and ten yellow. Then leaving the red marbles on the table, the teacher places all the yellow marbles in a can. One child closes his eyes and picks a marble from the can. What color does the class think he will get? We were amazed to see even ten year olds predict red, although all the red marbles are in plain sight on the table. We then change the odds (always showing the children how many marbles are in the can) and draw from nine yellow and one red. After many tries, on many different days, the children begin to see that what goes into the can determines what will come out. Even if their favorite color is red, if we are drawing from yellow marbles, we will get a yellow marble.

Now the children can start to make charts. They will draw twenty times from a can that holds two red marbles and one yellow one. They draw two red and one yellow marble at the top of a lined sheet of paper. After twenty draws from the can, there will be a red column twice as long as the yellow one, made of red marks for red draws, and yellow marks for yellow ones. We use spinners, too, where one-third of the ground is yellow, and two-thirds of it red. These may be the favorite activities of all, in the thinking lab. At every draw the children grip the table with all the intense emotion of heavy betters at the track.

One half hour of every week is set aside for Symbolic Logic. The Symbolic Logic material which we use was prepared at Catholic University by Drs. James Youniss and Hans Furth, specifically for use with elementary school age deaf children. It is essentially a non-verbal series of exercises which, taken together, make up a particular system of thinking. I quote, "After working through the exercises the child will have been exposed to a systematic method of analyzing the world around him. He should have learned that a particular object or event ... bears multiple relations to other objects and events ... (and) that any one thing can be classified accurately in a number of ways ... The child (is confronted) with the notion that any object or event can be an occasion for asking a question, that some questions have reasonable answers, while others have few".

Limitations of time make it impossible for me to demonstrate Symbolic Logic here. A demonstration film is available from Captioned Films. If I could show it now, you would see that Symbolic Logic has none of the forbidding aspects that its name suggests, but is, instead, one of the most popular games that the children play in the thinking lab. It offers them a real challenge, and they respond joyfully.

Those of you who are familiar with Piaget's work will have noticed that we have not spoken of conservation tasks. The ability to conserve means that the child grasps the mathematical idea that number is not changed when a set of object is divided into sub groups, and the physical idea that a change in shape or appearance does not change mass or substance.

That is; in mathematics, twenty onions will remain twenty onions, whether they are one big sack or in five small bowls; in physics, that you have the same amount of bubble gum whether you have just rolled it into a ball to tuck under your desk, or are pulling it, pink and shiny, into a long sticky string.

The attainment of the ability to conserve marks the transition from intuitive subjective thought, to thought that is more socialized and more conceptual, hence more adult.

Because of conservation's clear position in the beginning of the concrete operational stages of thought, this is a good area in which to test the changes in our children's thought. Therefore we do no experimental work with it in the thinking lab.

In September, before we began the experimental program, graduate students from Catholic University came to the school, and administered a series of Piaget type tests to all the primary children. They were also given appropriate intelligence, reading, and achievement tests. Testing was done again in May, and will be repeated next fall, and the following spring. A careful comparison of the test results for the control and experimental groups should provide much information about deaf thinking, and, hopefully, a new method of teaching.

Our testing is not finished. We have only worked at this for a year, and we need much more data to reach even tentative conclusions.

Again: the lab provides young deaf children with an opportunity for intellectual growth in an area in which they are not handicapped, their thoughts; it is our sincerest hope that we can prevent their thinking from becoming stunted and shallow.

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